How Much Can I Save By Retrofitting my Lights?

Very often people don't think about how much money is spent on lighting. This is especially true in the business environment. Businesses can easily spend 30% of their electric bills each month on the lighting in their facility. Since many facilities were originally built with the aim to minimize initial costs, most buildings do not have high efficiency lighting installed. For example, would you rather pay $0.75 for a light bulb or $20? In order to accurately answer this question one should calculate the total cost of ownership of that light bulb.

Let's calculate the cost to operate the $0.75 bulb, a 150W incandescent, for a year:

$$\text{Operating Cost} = \frac{150\text{W} \times \$0.10/\text{Kwhr} \times 3{,}000 \text{ Hours}}{1{,}000} = \$45.00 \text{ per year}$$

Now, let's do the same for the $20 bulb, a 42W compact fluorescent lamp:

$$\text{Operating Cost} = \frac{42\text{W} \times \$0.10/\text{Kwhr} \times 3{,}000 \text{ Hours}}{1{,}000} = \$12.60 \text{ per year}$$

So now the real question is would you pay $20 for a lamp that saves you $32.40 per year in energy costs? Calculating the Return on Investment (ROI) and Simple Payback answers this:

$$\text{ROI} = \frac{\$32.40}{\$20} = 162\%$$

$$\text{Simple Payback} = \frac{\$20}{\$32.40} = 0.62 \text{ Years}$$

Based on the ROI and payback the answer is a resounding, Yes! In addition, the compact fluorescent will easily last 10 times longer than the incandescent!

How about linear fluorescents?

Most facility managers would read the above and say that's all well and good but my facility already has fluorescents everywhere. The above exercise was meant strictly to prove a point. The point being that an investment in lighting can have a pay off like any other business investment; and that the payback from this investment needs to be calculated before laying out any capital monies.

So, now let's take a look at an office or industrial setting with existing 2'x4' T12 fixtures with four lights each. This is a very typical fixture that is found in thousands of businesses and schools across the United States.

Let's calculate the operating costs of the existing fixture:

$$\text{Operating Cost} = \frac{160\text{W} \times \$0.10/\text{Kwhr} \times 3{,}000 \text{ Hours}}{1{,}000} = \$48.00 \text{ per year}$$

Now, if the existing 2'x4' fixture is retrofitted to use two T8 lamps the operating costs drop to:

$$\text{Operating Cost} = \frac{44\text{W} \times \$0.10/\text{Kwhr} \times 3{,}000 \text{ Hours}}{1{,}000} = \$13.20 \text{ per year}$$

We can see that the retrofitted fixture will cost $34.80 **less each year** to operate. If we take into account the cost of labor and materials to retrofit the existing fixture, **the ROI is typically 50% with a payback of less than 2 years!** Even in a relatively small office of 100 fixtures, the business will be bringing $3,480 **directly to the bottom line** after two years. Keep in mind that these simple calculations do not include any state rebates or tax incentives that will further reduce the payback period.

But My Facility already has T8 Lamps!

Just like most other technology these days, lighting technology continues to change on a regular basis. If your facilities' fixtures are more than a few years old, chances are that even a lighting retrofit of existing T8 lamps/ballasts will still prove to be a viable investment.

If we repeat the above calculations based on a typical 32w T8 system (what many people consider to be "efficient") that was installed a few years ago and compare that to a modern, high efficiency T8 system we can see what type of savings can be achieved.

For the existing T8 system we have:

$$\text{Operating Cost} = \frac{59\text{W} \times \$0.10/\text{Kwhr} \times 3{,}000 \text{ Hours}}{1{,}000} = \$17.70 \text{ per year}$$

Now, for a modern T8 system we have:

$$\text{Operating Cost} = \frac{38\text{W} \times \$0.10/\text{Kwhr} \times 3{,}000 \text{ Hours}}{1{,}000} = \$11.40 \text{ per year}$$

From these numbers, we can see that the new fixture will cost $6.30 less each year to operate. This is like someone handing you **$6.30 for each and every light in your facility!** The savings is obviously much less dramatic than that of a T12 conversion but after taking into account the labor and material costs, the payback period is still typically in the 5 year time frame with a ROI of approximately 20%. You won't find that from any other low risk investment. Once again, any state rebates and tax incentives will increase this ROI and reduce this payback period.

How about the other lights in my facility?

Facilities tend to have a mixture of different technologies and lighting types…..metal halide, high pressure sodium, halogen, etc. Each of these will vary in their individual payback periods and whether or not it makes sense, from a purely economics standpoint, to replace them.

Are there any other savings?

Yes. All of these calculations have been kept very simple in order to convey the simple point that a lighting retrofit will save money. However, there are additional savings to be had, both in hard costs and soft costs. After a lighting retrofit the total cost of ownership will be lower.

Cost from a maintenance standpoint is reduced since lamps, lamp color, and ballasts are standardized across the entire facility after a retrofit. This means fewer parts to stock. In addition, the number of lamps and ballasts are reduced so there are fewer parts to fail thus making the system more reliable. With the lighting system consuming less power the electrical panels within the facility will be able to carry new loads without having to upgrade them. Additionally, more savings can be gained through the use of some simple controls such as occupancy sensors, timers and daylight harvesting controls.

On the soft side, employees constantly remark about the quality and consistency of the new lights. For example, new fluorescents have a higher color rendering index (CRI). This allows subtle variations in colors to be revealed and items to look 'crisper'. This makes for a more pleasant work environment for the employees….and when they feel better the business works better.

In this paper we haven't even looked at the environmental impact of performing a lighting retrofit. Based on the business's location in the country, a retrofit project will provide significant reductions in green house gases and polluting chemicals including carbon dioxide, nitrogen oxides, sulfur dioxide and mercury. In the larger scale view this saves society as a whole by reducing the cost of health related issues and preventing costly damage to the environment. This environmental friendliness will increases the value of the business in the consumer's eyes. Many firms will leverage this fact by promoting it in their literature and advertising material. In fact, many property owners have been able to demand higher rents, even in a down market, if their buildings are greener.

Quantifying the savings and ROI

The only way to properly quantify the cost-benefit of a potential retrofit is to perform a detailed audit of the existing system. This audit needs to be broad in scope accounting for each and every light in a facility, including information on ballast part numbers, current electrical bills and operating hours. This audit will then drive a detailed engineering design which will dictate the best retrofit to each of the existing fixtures.

A properly performed audit and design will clearly spell out the amount of savings both in terms of dollars and energy (kWh). In addition, it will clearly indicate the cost of performing the retrofit, the Return on Investment, and simple payback period.

About Innovative Energy Conservation…

Innovative Energy Conservation LLC (IEC) is a certified Woman Business Enterprise (WBE), located in Westfield, NJ, that provides energy conservation services specializing in lighting retrofits as the primary tool in reducing electricity consumption.

The core business service combines a detailed engineering design coupled with the highest quality installation as a turnkey project to our clients. We provide services along the east coast from Vermont to Virginia and as far west as the Ohio border. Based in Central/Northern New Jersey, we are located close to all major highways enabling a quick response to any projects' needs.

IEC provides unparalleled service to its customers in the design, implementation, installation, service and warranty of turnkey lighting retrofits through various industries ranging from municipalities, school districts, hospitals, hotels, offices, apartment buildings, warehouses, manufacturing plants, retail, or any other space that consumes electricity via artificial lighting.

www.InnEnergy.com Tel: (908) 451-2202